A New Combination in *Phemeranthus* (Montiaceae) and Notes on the Circumscription of *Phemeranthus* and *Talinum* (Talinaceae) from the Southwestern United States and Northern Mexico

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Abstract. The name *Talinum parvulum* Rose & Standl. is transferred to *Phemeranthus* Raf. (Montiaceae) as *P. parvulus* (Rose & Standl.) D. J. Ferguson & T. M. Price. Described in 1911 from Durango, Mexico, this species closely resembles *P. marginatus* (Greene) Kiger [≡ *T. marginatum* Greene], which was described in 1912 from Nayarit. *Phemeranthus marginatus* is here treated as a taxonomic synonym of *P. parvulus*.

Key words: Mexico, Montiaceae, North America, *Phemeranthus*, Portulacaceae, *Talinum*.

Recently, the genus *Phemeranthus* Raf. has been resurrected to accommodate the predominantly North American terete-leaved species of *Talinum* Adans. (Portulacaceae s.l.) (Hershkovitz & Zimmer, 1997; Kiger, 2001; Ocampo, 2002, 2003). Molecular and morphological evidence demonstrates that *Phemeranthus* is distinct from and only distantly related to *Talinum* s. str. (Carolin, 1987; Hershkovitz, 1993; Hershkovitz & Zimmer, 1997, 2000; Applequist & Wallace, 2001; Nyffeler & Eggli, 2010). Multiple well-supported clades have been recognized at the family level within the traditional Portulacaceae. Based on phylogenetic analyses of nuclear (ITS) and chloroplast (*ndhF*, *matK*) sequences, *Talinum* s. str. and its close relatives are more closely related to *Portulaca* L. and the Cactaceae than to *Phemeranthus*. Exemplars from the latter genus resolve within a clade of predominantly western North American taxa (Hershkovitz & Zimmer, 1997, 2000; Applequist & Wallace, 2001; Applequist et al., 2006) that has been elevated to family level as the Montiaceae (Angiosperm Phylogeny Group, 2009; Nyffeler & Eggli, 2010). *Talinum*, *Talinella* Baill., and the monotypic taxon *Amphipetalum* Bacigalupo constitute the small but heterogeneous family Talinaceae (Nyffeler & Eggli, 2010). Under this recent reclassification, Portulacaceae s. str. now comprises only the single genus *Portulaca* (Angiosperm Phylogeny Group, 2009; Nyffeler & Eggli, 2010).

Most terete-leaved *Talinum* species distributed in the United States have been previously transferred to *Phemeranthus* (Hershkovitz & Zimmer, 1997; Kiger, 2001) and were treated as such in the *Flora of North America* (Kiger, 2003a). Four Mexican species were also previously transferred (Ocampo, 2002, 2003). The combination *P. punae* (R. E. Fr.) Eggli & Nyffeler has been published recently for a disjunct species in northern Argentina (Nyffeler & Eggli, 2010). Originally described as *Calandrinia punae* R. E. Fr., this species was previously treated as *T. punae* (R. E. Fr.) Carolin; *Calandrinia* Kunth is also now placed within the Montiaceae. Herein, we further propose the transfer of *T. parvulum* Rose & Standl. to *Phemeranthus*. Described in 1911 from Durango, Mexico, this species closely resembles *P. marginatus* (Greene) Kiger, which was described in 1912 from material collected in 1897 in Nayarit, Mexico. We treat the latter as a taxonomic synonym of the former.

Phemeranthus parvulus (Rose & Standl.) D. J. Ferguson & T. M. Price, comb. nov. Basionym: *Talinum parvulum* Rose & Standl., Contr. U.S. Natl. Herb. 13: 283. 1911. TYPE: Mexico. Durango: Otinapa, 25 July–5 Aug. 1906, *E. Palmer 451* (holotype, US-571476; isotypes, GH not seen, K [barcode] 424706 image, NY [barcode] 342320).

Talinum marginatum Greene, syn. nov. Leafl. Bot. Observ. Crit. 2: 270. 1912. *Phemeranthus marginatus* (Greene) Kiger, Novon 11(3): 320. 2001. TYPE: Mexico. Nayarit: Sierra Madre near Santa Teresa, Tepic, 12 Aug. 1897, *J. N. Rose 2221* (holotype, US-301135).

Discussion. *Phemeranthus parvulus* (bottle-leaf fameflower) is distinguished by its tiny size (up to 5 cm tall, and often only 2–3 cm tall) and apparently petiolate leaves, which are strongly narrowed toward the base. These characteristics similarly distinguish *P. marginatus*. The type specimens of *Talinum parvulum* and *T. marginatum* at US appear to differ

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mainly in size. *Talinum parvulum* is extremely small, with slender leaves whose narrowed petiole-like portion is as long as or longer than the expanded distal portion, and with minute seeds (about 0.5 mm wide). *Talinum marginatum* appears to be larger, with plants to 5 cm high; has thicker leaves whose narrowed petiole-like portion is equal to or shorter than the expanded, oblanceolate-spatulate distal portion; and has broader seeds (nearly 1 mm in diam.).

The name *Talinum marginatum* has been usually applied to specimens from Arizona, Sonora, and Chihuahua. The southern part of the range (e.g., Nayarit, where the type specimen for *T. marginatum* was collected) is poorly represented in herbaria. Application of the name *T. parvulum* has apparently been limited to specimens collected from Durango, where the type specimen was collected. Wilson (1932), Von Poellnitz (1934), and Eggli (2002) treated these as separate species, but their judgments were probably impacted by the small number of available specimens. In his 1912 description of *T. marginatum*, Greene did not mention *T. parvulum*, but rather compared his species to *T. humile* Greene (sic, as *humili*) and *T. greenmanii* Harshb. (sic, as *Greenmanianum*), stating that the new species differed from the latter two in having flat, scarious-margined leaves rather than linear, terete leaves. This observation was clearly based on herbarium material rather than on living plants; such scarious margins occasionally appear as artifacts of the drying process in probably all *Phemeranthus* species.

Available specimens show a more or less continuous range of variation from the very small typical *Phemeranthus parvulus* to the much larger *P. marginatus*, and plants at a given locality can vary between the two extremes from year to year depending on environmental conditions (Ferguson, pers. obs.). Although further study is needed, there appear to be no distinctive characters to separate the two entities, and we conclude that they are conspecific. Thus, *Talinum marginatum* is synonymous to *T. parvulum*. *Phemeranthus parvulus* should be applied to the merged taxon, which is widespread in the Sierra Madre Occidental from southern Arizona south to Nayarit.

Phemeranthus multiflorus (Rose & Standl.) G. Ocampo also closely resembles *P. parvulus*, differing in its non-petiolate leaves (although this character may be difficult to distinguish in herbarium material due to shrinkage in drying) and its larger inflorescences, which usually well exceed the leaves and tend to sprawl. The inflorescences of *P. parvulus* also often exceed the leaves, but at least the lowermost flowers and capsules are borne among the leaves, and the inflorescences appear more erect and congested. The names *Talinum parvulum* and *T. multiflorum* Rose & Standl. were published concurrently in 1911 by Rose and Standley, who distinguished the former species by its small size (2.5 cm or less), petiolate leaves, and inflorescences not exceeding the leaves; and the latter species by its larger size (up to 10 cm), non-petiolate leaves, and spreading, highly branched inflorescences much surpassing the leaves. Further investigation may indicate that *P. parvulus*, *P. marginatus*, and *P. multiflorus* all form a single variable species.

Specimens examined. MEXICO. **Chihuahua:** 3.3 mi. S of Chorro de Agua on rd. to sawmill El Cuervo, *T. R. Van Devender 87-117* (ARIZ-271668); Cascada de Basaseachic, *M. Fishbein 1790* (ARIZ-315550). **Durango:** Otinapa, *E. Palmer 451* (NY [barcode 342320], US-571476); along dirt rd. betw. Hidalgo del Parral & El Vergel, ca. 58 mi. W of Parral & 23.1 mi. W of Ojito, *J. L. Reveal 3091* (MO-3038554). **Nayarit:** Sierra Madre near Santa Teresa, Tepic, *J. N. Rose 2221* (US-301135). **Sonora:** 3.4 km N of Yecora on rd. to Agua Blanca, *A. L. Reina 97-766* (TEX-258804). U.S.A. **Arizona:** Cochise Co., Huachuca Mtns., Mud Spring fork of Sycamore Canyon, *M. Fishbein 1317* (ARIZ-306552); Santa Cruz Co., 5 mi. S of Sonoita, *J. Kaiser 1545* (ARIZ-270807).

Notes on the Circumscription of *Phemeranthus* and *Talinum*

Kiger (2001) transferred *Talinum aurantiacum* Engelm. to *Phemeranthus*, treating *T. angustissimum* (Engelm.) Wooton & Standl. and *T. whitei* I. M. Johnst. as its synonyms in 2003. However, Applequist and Wallace (2001) included samples of *T. angustissimum* and *P. mengesii* (W. Wolf) Kiger in a phylogenetic analysis of chloroplast *ndhF* sequences from the Portulacaceae s.l. Their data supported *P. mengesii* as sister to a clade of predominantly western North American taxa that included exemplars from *Calandrinia*, *Calyptridium* Nutt., *Cistanthe* Spach, *Claytonia* L., *Lewisia* Pursh, *Montia* L., and *Montiopsis* Kuntze (all of which are now placed in the segregate family Montiaceae). However, the sampled accession of *T. angustissimum* fell within a clade of other *Talinum* and *Talinella* species. Thus, the *ndhF* evidence strongly contradicted the inclusion of *T. angustissimum* in *Phemeranthus*. Similar results were obtained in a later study using an expanded version of the same data set (Applequist et al., 2006). Additional molecular data from several chloroplast loci for multiple accessions of *P. aurantiacus* (Engelm.) Kiger sensu Kiger, 2003a (Price, unpublished) strongly indicate that this taxon falls within the *Talinum* clade and is only distantly related to *Phemeranthus*. Moreover, Eggli (2002)

treated *T. angustissimum*, *T. aurantiacum*, and *T. whitei* all as synonyms of *T. polygaloides* Gillies ex Arn., which was described from Argentina. In a molecular phylogenetic study of the relationships among the Cactaceae and its closest relatives, Nyffeler (2007) sampled a *T. polygaloides* exemplar from Argentina, which was strongly supported as sister to *T. caffrum* Eckl. & Zeyh. within the *Talinum* clade.

Morphologically, *Phemeranthus aurantiacus* exhibits several characteristics that are inconsistent with the genus. The leaves, while narrowly linear, are planar rather than terete to sub-terete in shape and have distinct midveins. The flowers are yellow, orange, or reddish orange; other *Phemeranthus* species possess purplish or rosy-pink, white, or yellow (but not orange) flowers. The inflorescences consist of solitary flowers or 2- or 3-flowered cymules in leaf axils, rather than many-flowered cymes borne on lateral or terminal, scapelike peduncles. Although the seeds have distinct concentric ridges rather than a minutely tuberculate surface like those of most other *Talinum* (Kiger, 2003b), they lack the investing aril or pellicle (a thin, papery covering) present in other *Phemeranthus* seeds. Thus, based on the combination of molecular and morphological evidence, *T. aurantiacum* should clearly be retained in *Talinum*.

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